

STATUS REPORT ON THE REVIEW OF THE PROPOSED CRANDON MINE: July 2001

Department of Natural Resources
Box 7921, Madison, WI 53707
July 20, 2001

See our Crandon Project Web site at: <http://www.dnr.state.wi.us/org/es/science/crandon/> for an overview of our review process as well as maps and other related information.

The Department's Review of the Proposed Mine

Several critically important work items remain to be finished before we can complete our permit and environmental reviews of the proposed Crandon mine. The remaining work items are listed below and are explained in greater detail in the following sections:

- Complete groundwater flow modeling and mine inflow estimates at the proposed project site;
- Provide final comments on the company's surface water mitigation plan;
- Conduct final review of tailings management area waste chemistry;
- Complete analysis of tailings management area impacts to groundwater quality;
- Review re-flooded mine water chemistry;
- Review re-flooded mine impacts to groundwater quality;
- Review the company's plan for its irrevocable trust; and
- Complete preliminary review of mining moratorium candidate mine sites.

Groundwater flow modeling and mine inflow estimates at the proposed project site - Last year the Department and our consultants completed work on our regional groundwater flow model for the proposed mining site. The groundwater flow model is a computer-assisted representation of the groundwater in the bedrock and glacial sediments and its interactions with surface waters of project area lakes and streams. The model is used to simulate the proposed mine and help in evaluating how mine development would affect groundwater and surface water levels. Final work on the model involved incorporating many changes, including significant adjustments in how the bedrock and the ore body were represented. These changes resulted in mine inflow estimates that we released to the public with a range that was higher than that developed by the company.

Following our work, the Nicolet Minerals Company announced that it would make changes to its proposed grouting plan for the underground mine. Grouting is a technique extensively used in the mining industry to reduce the amount of water seeping into a mine. By injecting a mixture of cement with small amounts of performance-enhancing additives under pressure through drill holes bored into the surrounding bedrock, the amount of water flowing or seeping out of the rock and into the mine workings can be greatly reduced. The company's revised plan proposes additional grouting part way down the sides of the ore body in addition to the grout blanket at the top of the mine as previously proposed.

We have incorporated the company's revised grouting plan and the locations of the mine access openings into our flow model, and we anticipate finishing our flow modeling work and releasing to the public our revised range of mine inflow numbers this summer. Our final flow model predictions of the effects of the project on groundwater and surface waters will be summarized in our draft environmental impact statement. Our technical flow model report will be released at approximately the same time as the draft environmental impact statement.

Final comments on the company's surface water mitigation plan- When we complete our flow modeling work, we will have our estimated range of water quantity impacts to lakes and streams in the project area resulting from the associated groundwater drawdown. These estimates will provide the basis for providing a final

review of the company's surface water mitigation plan, which is designed to prevent the "unreasonable detriment" (as required by the mining law) to lakes and streams from the mining project. The Department has established lake levels and stream flows in the project area that must be maintained to prevent their unreasonable detriment. If the groundwater drawdown caused by mine pumping would affect a lake or stream by reducing its level or flow below the minimum established threshold, the company would have to add water to that water body. The water would have to be similar in quality to the lake or stream water and be sufficient in quantity to prevent the unreasonable detriment to the lake or stream. Our draft environmental impact statement will describe the surface water mitigation plan and how it could affect water bodies close to the mine.

Final review of tailings management area waste chemistry - Department staff and consultants continue to evaluate the chemistry of the wastes proposed for disposal in the tailings management area (TMA). The TMA would be a surface waste disposal facility similar in design to a modern, engineered landfill. The bulk of the wastes would be depyritized tailings, but wastewater treatment plant sludge, waste rock and other wastes would be disposed there as well. The company has proposed to keep the TMA wastes from potentially becoming acidic, and would add limestone if necessary to make sure that there could not be production of excess acid. Pyritic tailings, which have the greatest potential for acid generation, would be backfilled in the mine, where the potential for oxidation would be greatly reduced once the mine re-floods.

In order to understand the chemistry of the wastes mixed with the process water from the mill, and to evaluate chemical changes over the course of the project, we have conducted additional computer modeling of the waste chemistry (termed geochemical modeling) and evaluated how oxidation reactions could affect the wastes. Upon completion of the geochemical modeling, the Department will have a better understanding of the anticipated chemistry of the leachate. This is important because some of the leachate would leak from the facility and the reclaim pond and would affect local groundwater quality. It is also necessary to know the composition of the leachate in order to evaluate how it might react with the liner materials in the facility. Geochemical modeling is also helpful in evaluating the potential for precipitation reactions that could clog the drain layer (the layer constructed near the base of the entire TMA to help drain leachate) and pipes in the facility.

Analysis of tailings management area impacts on groundwater quality - Following work on the chemistry of the tailings management area wastes, the Department will complete its analysis of how much leakage might reach the groundwater beneath the TMA and reclaim pond and where the contaminants would go once they reached the groundwater. This information will be evaluated using a computer model to help in estimating the potential effects on groundwater quality. Much of this work has already been completed. The groundwater regulations require that the TMA and reclaim pond comply with groundwater quality standards at all times.

Review re-flooded mine water chemistry - During active mining, the underground openings from which ore would be removed, or stopes, would be backfilled with the pyrite-rich tailings segregated in the mill. Cement would be added to the backfilled tailings for underground structural stability as well as to maximize mineral removal. Following mine re-flooding, the long term impacts to groundwater quality depend partly on the chemistry of the backfilled pyritic tailings, the degree of oxidation and acid production, and on groundwater movement in and around the mine workings. Groundwater quality around the mine also could be affected by accumulated oxidation products on the mine walls and from pollutants left in the mine. Department staff and consultants need to complete their review of the mine water chemistry in order to help assess its impacts on groundwater quality.

Review re-flooded mine impacts to groundwater quality - At the end of mining, groundwater would no longer be pumped from the mine, allowing the mine workings and backfilled cavities to re-saturate as the mine re-floods during groundwater table recovery. During mining, localized groundwater flow would be directed inward toward the mine. Therefore, during this period there would be no potential for contaminants to migrate out of the mine. After groundwater recovery, however, the groundwater flow system would likely be similar to pre-mining groundwater flow, and a very small outward flow gradient from the re-flooded mine would be reestablished.

The Department is evaluating the potential for the re-flooded mine to affect groundwater quality in the bedrock around the mine. Some pollutants would remain in the underground mine from mining operations due to oxidation during the period of mine pumping. In addition, other contaminants would be introduced with the backfilled pyritic tailings. The groundwater rules require the abandoned mine to meet groundwater standards forever.

The Department currently is reviewing the Re-flooded Mine Management Plan. In the plan, the company proposes a series of actions to minimize the amount of pollutants in the mine both before and during the re-flooding process. The activities include the installation of high efficiency oxygen barriers in passageways to reduce mineral oxidation, the removal of spilled ore and waste rock from the mine workings, flushing of exposed surfaces at the end of mining, removal of areas of oxidized backfill, and, if necessary, high volume extraction of water from the mine workings following the re-flooding process to flush out readily accessible contaminants. Finally, if necessary, long-term pumping of contaminated water from the mine would be conducted to maintain inward flow gradients and prevent groundwater pollution.

Review the company's plan for its irrevocable trust - In February 2000, section NR 132.085, Wisconsin Administrative Code, was created, establishing the irrevocable trust agreement requirement for a company applying for a mining permit. Under this requirement, the company must propose an irrevocable trust pertaining to financial responsibility in the event of environmental contamination and to pay for implementation of certain types of preventive measures. The owner of a mining site must establish the irrevocable trust fund prior to the start of mining. The trust fund would continue perpetually after mining operations have ended. The trust does not replace an owner's liability under other provisions of law, but is intended to serve as a backup source of funding.

Trust fund requirements would be based on costs associated with certain reasonably anticipated preventive measures, as well as remedial actions related to unanticipated spills, releases from mining and mining waste facilities, and replacement of damaged water supplies. The final amount of the fund and the final schedule of payments would be determined at the Master Hearing, following input from all parties. The fund would be structured such that after the period of scheduled deposits by the operator, it would be self-sustaining and adequate to finance necessary preventive and remedial actions forever. The Department would review the fund every five years for adequacy and adjust it if necessary.

The trust would be maintained by a public agency, bank or financial institution in Wisconsin, and it would be a perpetual trust. Only the Department of Natural Resources could authorize payments from the trust for preventive measures to avoid adverse environmental consequences or for remediation measures at the project site. The amount deposited in the fund by Nicolet Minerals Company would apply only to the Crandon project. The company must propose funding for the trust, and the Department must review the proposal before completion of the permit and environmental review processes.

Complete preliminary review of mining moratorium candidate mine sites - In 1998 the Legislature passed and the Governor signed what is commonly called the "Mining Moratorium". The mining moratorium requires that the mining company applying for a mining permit identify mines that meet several criteria. The criteria require that the candidate mines be in a sulfide ore body mine, that the mines be located in the United States or Canada, and that the ore body and host rock together must have the potential to be a net acid generator. Additional criteria require that a mine must have been operated for 10 years, and another or the same mine must have been closed for 10 years, without polluting the surface water or groundwater from acid drainage or heavy metals. To be considered acceptable example mines, the candidates cannot be abandoned mines or mines identified on the Superfund's National Priorities List or mines which have resulted in violations of environmental laws as determined by an administrative proceeding, civil or criminal action. Violations of laws also include those instances where there was an issuance of an order requiring corrective action, a fine, forfeiture or penalty.

The Legislature established the mining moratorium approval process consistent with the existing approval process for all of the other mine permitting criteria. That is, before the decision-maker can issue the mining permit, there must be compliance with all of the listed criteria, including the mining moratorium provisions. This means that compliance or non-compliance with the moratorium criteria is judged at the end of the process, after all the information has been verified, evaluated and discussed at the Master Hearing.

The Nicolet Minerals Company submitted three candidate mines for consideration as fulfilling the requirements of the mining moratorium law. The candidate mines are as follows:

The **McLaughlin Mine**, located about 70 miles north of San Francisco, California, is owned and operated by Homestake Mining Company. It is an open pit gold mine that began operations in 1983 and is still producing today. It was submitted as a mine that complies with the 10-year or longer operations period criterion.

The **Cullaton Lake Mine**, is located in Canada's Northwest Territories some 416 kilometers northwest of Churchill, Manitoba. It is owned by Homestake Canada Inc., of Vancouver, British Columbia. This was an underground gold mine developed and operated between 1976 and 1985, and has been closed ever since. It was submitted as a candidate mine to comply with the 10-year closure period criterion.

The **Sacaton Mine**, located just west of Casa Grande, Arizona, is owned and was operated by ASARCO of New York, New York. It was an open pit copper mine operated from 1972 until its closure in 1984, and has remained closed since. It was submitted as a candidate mine to comply with both the 10-year operational and 10-year closure criteria.

The Department has inspected the three candidate mines, met with key state, territorial and federal regulators and obtained pertinent file information on each facility. Additional follow-up work will be conducted to update our file information on the three mines. The Department plans to summarize and release its information on the three candidate mines at about the same time as the release of the draft environmental impact statement.

Project schedule - Because we must first complete all of our technical environmental reviews, and several are ongoing, our exact schedule for releasing the draft environmental impact statement on the proposed mine is uncertain. If we develop significant additional information needs, identify plan deficiencies or discover other potential problems during our review work, there may be additional time before our review is complete.

For additional information on the Department's review of the proposed Crandon mine, contact:

Dave Kunelius
Department of Natural Resources
107 Sutliff Avenue
Rhinelander, WI 54501

Phone: (715) 365-8924
Email: kuneld@dnr.state.wi.us